

AUG 1 1923

SIGMA XI = QUARTERLY

Vol. IX

DECEMBER, 1921

No. 4



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Published by the Society of the Sigma Xi

ANNUAL SUBSCRIPTION \$1.00 SINGLE NUMBER 25 CENTS

Changes of address should be communicated only to chapter secretaries.

Subscriptions and manuscripts should be sent to the general secretary, Henry B. Ward, Urbana, Illinois.

Entered as second-class matter July 21, 1915, at the post office at Menasha, Wisconsin,
under the Act of August 24, 1912.

Acceptance for mailing at special rate of postage provided for in section 1103, Act of
October 3, 1917, authorized on July 5, 1918

SIGMA XI QUARTERLY

EDITORIAL COMMITTEE

Floyd Karker Richtmyer Edwin Emery Slosson
Henry Baldwin Ward

VOL. IX

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ANNOUNCEMENT

The Twenty-second Convention of the Society of the Sigma Xi will be held in Toronto, Canada, in connection with the scientific meetings of convocation week. At the meeting of the Executive Committee last May the formal invitation to meet there was received and accepted and Wednesday, December 28, was decided upon as the time. A special committee has been appointed to provide for a program in accordance with the suggestions made at the Chicago convention by Dean Colter and approved by that convention. The general plan adopted by this committee is as follows:

- 2:00 P. M. public meeting with address by Dr. J. C. Merriam
- 4:00 convention business session
- 6:30 convention banquet
- 8:30 general social assembly

This special committee is planning for a more elaborate convention than has been held in the past and it is hoped that this will serve to mark a new era in the history of the society. Consonant with the development of the convention in a significant way comes the announcement in this number concerning the results of the campaign to endow a fellowship and the appointment of the first investigator under the auspices of the Society. These new movements make the matter of appointing delegates of the utmost importance and Professor McClung has sent to each chapter a special letter calling attention to this situation. It is hoped that the problem may receive the earnest attention of each member and that the chapters will make a special effort to lend their best assistance to the convention in every possible way.

THE TORONTO CONVENTION

There is important work to be done at the convention in Toronto. It requires the careful consideration of the best minds in the Society. Upon our various chapters rests the obligation of seeing that those prepared by interest and experience to give careful consideration to the business of Sigma Xi are there in the person of their representatives. Attention has been called to the need of foresight in the selection of delegates through letters to the chapter presidents, since they are the ones usually charged with the duty of appointment. If chapters could see their way clear to paying the expenses of delegates, who would then give time and attention to the business of the convention, much more constructive work could be done. In the absence of such careful study and preparation in advance of meetings, it is inevitable that the affairs of the Society should sometimes suffer neglect or experience hasty action.

Indeed it is fair to raise the question whether the Society can function effectively as a body, in its growing size and importance, with the present organization. Will it not be necessary, as in past stages of active growth, to delegate more power to the Executive Committee? I believe it will be agreed by all those intimately in touch with the affairs of the Society that it has been a much more effective body since the present form of organization, with greater power conferred on the Executive Committee, has been in operation. Now that the list of chapters is increasing and society activities becoming more comprehensive and diversified, it is increasingly important to provide a proper machinery for competent administration. Such matters are worthy of our most serious consideration.

Among the items of business before the convention will be the report of the Fellowship Committee. This should bring great satisfaction and encouragement to all who see the future of Sigma Xi with an eye sensitive to possibilities of greater service. No one thing in our history has demonstrated the fundamental need of such an organization as has the response to the request for money to support a system of research fellowships. When people, merely on an appeal through circular letters, are ready to put money into something, from which they expect no personal return, they indeed believe in it.

What then shall be done to care for the thousands of former active members who have left our colleges and universities, but who have retained an unexpected and vital interest in Sigma Xi? The canvass for funds to support the fellowship system has revealed the fact that we have been neglecting one of our most important duties and have lacked the support of yearly increasing numbers who could help mightily in carrying forward the really important work of the society. The committee on revision of membership has a plan to present which appears to the Executive Committee calculated to take advantage of this potential resource. This will be presented for action at Toronto.

During the year the Executive Committee has given very careful consideration to the applications of a number of institutions desiring chapters. Action upon the report of the committee upon these applications will be required. The number and character of the schools asking for connection with the Society indicate that the conviction that the organization has a wider field of usefulness than it has filled is correct.

Discussion of activities and policies this year will occur in surroundings of more than usual interest and significance. Sigma Xi is now approaching somewhat of a limit to its range of operation in this country—as yet it does not touch directly the life of any foreign institutions. If we commend ourselves in vision and action to our fellows in Canada, it may well be that thus we shall pass beyond national boundaries and become an international force to the development of scientific research.

Of much importance indeed is the selection of officers for the coming biennium, which will be a part of the business before the convention. Such action will be taken upon the report of a nominating committee, which will give careful thought to the needs of the Society in its recommendations. Should there be suggestions for the guidance of this committee they may be sent to the secretary for transmission to it.

Taking everything into consideration this is one of the most significant of our conventions and all chapters should be actively concerned to see that nothing is lacking in the way of preparation to make it a real success.

C. E. McCLEUNG

SIGMA XI EXPENSES

The quality of a thing is fairly measured by its cost in money. No really good thing can be obtained at a small price. The principle is applicable to the conduct of an organization as well as to the securing of material things.

Thirty-five years ago when Sigma Xi was a small and relatively unimportant organization, the expenses of conducting its affairs were almost nothing. Since 1885 fundamental changes have taken place in the Society, not only in numerical growth, but also in expansion of policy—changes that are of vital importance to the Society and to the scientific interests of this country. The growth of the Society has affected all its departments of administration. The work of the secretary's office has been increased to an extent commensurate with the development of the Society to thirty-three chapters and thirteen thousand members. It would be criminal if the work of that office were curtailed in the slightest degree; curtailment could not be justified either in the minds of Sigma Xi men and women or of scientific men in general.

The affairs of the Society for which the Executive Committee is rightly held responsible must be conducted with the utmost caution and wisdom. This committee properly consists of representatives from different sections of the country, busy men who are willing to give of their ability and judgment and time to the successful conduct of the organization. If the work of the Executive Committee is to be done effectively and wisely, there will be connected with it an inevitable expense. This does not mean at all that the affairs of the Society are to be conducted extravagantly; such a tendency could not be justified. It means clearly and emphatically that the affairs of the Society must not be conducted so economically as to be ineffective or to curtail in any way the influence and work of the organization or to retard its growth. There is a point where economy becomes extravagance. Such economy could not be justified. Those who are responsible for the Society are responsible alike to prevent extravagance and to avoid too great economy. No curtailment must be permitted, no contentment with the *status quo* must be tolerated. The only safe attitude for an important organization like ours to take is to accept responsibilities of growth and expansion with all that they imply of increased care and cost.

The proposal of the Indiana Chapter to have the initiation fee of every new member include a dollar for the general society is amply justified by the situation. It is a matter of pride to everyone connected with Sigma Xi that the Society's affairs have become so important as to demand additional funds in the treasury. Our slogan must ever be FORWARD. We would be untrue to the spirit of research if we should ever stop moving forward; and for Sigma Xi to go backward would be such a shameful thing that no loyal member could harbor for a single instant such a thought about the Society.

E. E.

THE NEW CHAPTER AT AMES

HISTORICAL SKETCH

The initial step which led to the founding of the Iowa State College was taken by the General Assembly of the State of Iowa in 1858 when they authorized the appointment of a commission to select and purchase a site for the institution. This was accomplished in 1859, the location being fixed at Ames. Due to the Civil War, no further steps were taken until 1862 when the institution was designated as the recipient of the congressional land grant to the state. The college formally opened its doors to students March 17, 1868, and conferred the first degree in 1872.

Practically since the beginning of instruction opportunity has been afforded for graduate work. Much of the inspiration for this early development was due to the energy of Dr. Charles E. Bessey, who was for the first fifteen years head of the Department of Biology. Under him Dr. Herbert Osborn of Ohio State University and Dr. J. C. Arthur of Purdue University received their first graduate training. In recent years the graduate work and research activities of the institution have been greatly multiplied. In 1913 the graduate school was reorganized, and a graduate faculty authorized and placed in charge.

It is the policy of the Iowa State College definitely to encourage research on the part of the various faculties and staffs. This has been manifested by the specific appropriation of funds, for use by staff members in research, by the building and equipment of laboratories specifically for the research work of the staff, by the utilization of the physical plant and resources of the Agricultural and Engineering Experiment Stations, by the appointment and support of research professorships in the college, and by the creation of research positions in which the majority devote their time entirely to the prosecution of their investigations and the direction of the work of graduate students. The graduate enrollment for the current college year (1921-22) is to date (October 1, 1921) three hundred twenty-five.

An active research organization, the Osborn Club, has during the past several years done much to quicken interest and enthusiasm in this field. Its success and the evident growth of the graduate school

led a group of members of Sigma Xi in the faculty seriously to consider petitioning for a chapter of this organization. After mature deliberation the decision was reached that the time was opportune, a petition was prepared and submitted to the officers of the Society. Upon the recommendation of the Executive Committee a charter was granted to the petitioners providing for the establishment of a chapter at the Iowa State College. The charter was voted at the Convention of Sigma Xi held in Chicago, December, 1920.

The charter granted by the Chicago convention was prepared by the national secretary in accordance with the instructions from the Executive Committee and on the basis of the list of names furnished by the committee at Ames and representing the enrollment of Sigma Xi men in the institution at that time. Circumstances postponed the installation of the chapter from spring until fall and the record of membership in the institution has been considerably enlarged. This is clear evidence of the policy of the institution that in looking for additions to the faculty it has secured such a large number of men who had already been elected to the Sigma Xi on the basis of their standing as investigators.

The charter reads as follows:

To Whom It May Concern:

Be it known that a charter for the establishment of a Chapter of the Society of Sigma Xi in the Iowa State College of Agriculture and Mechanic Arts is hereby granted to the following persons as Charter Members conveying to them and their duly elected associates and successors all the privileges conferred by the Constitution of the Society; provided that the Chapter shall have power to elect undergraduates to associate membership only:

Arthur Lawrence Bakke	Almon Homer Fisher
Francis Marsh Baldwin	Ellis Ingham Fulmer
Elmer Darwin Ball	Sidney Longman Galpin
Spencer Ambrose Beach	Henry Gilman
Samuel Walker Beyer	Joseph Charles Gilman
Frank Emerson Brown	John Howell Griffith
Percy Edgar Brown	Bernard Wernick Hammer
Robert Earle Buchanan	Harlan Woodbridge Johnson
Julia Trueman Colpitts	Joseph Vance McKelvey
Winfred Forrest Coover	Henry Max McLaughlin
Jay Brownlee Davidson	Charles Curtis Major
John Marcus Evvard	Anson Marston
Frederick Azel Fenton	John Nathan Martin
Fred Allen Fish	Irving E Melhus

Charles Murray
 Victor Emmanuel Nelson
 Louis Hermann Pammel
 Raymond Allen Pearson
 George Waddell Snedecor

John Anderson Wilkinson

Charles Henry Stange
 Harold Stiles
 Anna Helen Tappan
 George Waddell Snedecor
 Thomas Franklin Vance

In Witness Whereof the signatures of the President and Secretary and the Seal of the Society are hereunto affixed on this the Thirtieth day of December, in the year of our Lord Nineteen Hundred Twenty.

President, CLARENCE ERWIN MCCLUNG

Secretary, HENRY BALDWIN WARD

INSTALLATION OF THE CHAPTER

The installation of the chapter occurred on the afternoon of October 27, 1921, in the parlors of Alumni Hall on the campus at Ames.

Dr. C. E. McClung (University of Pennsylvania) national president of Sigma Xi and Dr. Henry B. Ward (University of Illinois), secretary, were present to conduct the ceremonies of installation. Dr. H. L. Reitz (University of Iowa) attended as a representative of the Iowa Chapter.

The following members of Sigma Xi were present at the installation. In each case is given the name of the chapter of Sigma Xi by which the person named was elected and the position now held at Iowa State College.

ARTHUR LAWRENCE BAKKE, Chicago	<i>Associate Professor of Plant Physiology</i>
FRANCIS MARSH BALDWIN, Illinois	<i>Associate Professor of Physiology</i>
NATHANIEL JOHN BEABER, Chicago	<i>Graduate Assistant in Chemistry</i>
FRANK EMERSON BROWN, Chicago	<i>Associate Professor of Inorganic Chemistry</i>
ROBERT EARLE BUCHANAN, Chicago	

Dean of the Graduate Faculty and Professor of Bacteriology

JULIA TRUEMAN COLPITTS, Cornell	<i>Associate Professor of Mathematics</i>
WINFRED FORREST COOVER, Ohio	<i>Professor of Chemistry</i>
JAY BROWNLEE DAVIDSON, Nebraska	<i>Professor of Agricultural Engineering</i>
LAWRENCE WOOD DURRELL, Ohio	

Assistant Chief of Botanical Section, Agricultural Experiment Station

JOHN MARCUS EVVARD, Illinois	<i>Professor of Animal Husbandry</i>
IVA ERNSBURGER, Nebraska	<i>Instructor in Mathematics</i>
DANIEL CLEVELAND FABER, Illinois	<i>Director, Engineering Extension</i>
FREDERICK AZEL FENTON, Ohio	<i>Associate Professor of Entomology</i>
FRED ALLEN FISH, Ohio	<i>Professor of Electrical Engineering</i>
ALMON HOMER FISHER, Washington	<i>Professor of Civil Engineering</i>
ELLIS INGHAM FULMER, Nebraska	<i>Associate Professor of Bio-chemistry</i>

SIDNEY LONGMAN GALPIN, Cornell	<i>Associate Professor of Geology</i>
WILLIAM GEORGE GAESSLER, Ohio	
	<i>Chief of Chemical Section, Agricultural Experiment Station</i>
JOSEPH CHARLES GILMAN, Wisconsin	<i>Assistant Professor of Plant Pathology</i>
CORNELIUS GOUVANS, Northwestern	<i>Assistant Professor of Mathematics</i>
JOHN HOWELL GRIFFITH, Wisconsin	<i>Professor of Civil Engineering</i>
JOSEPH EDWARD GUTHRIE, Minnesota	<i>Professor of Zoology</i>
BERNARD WERNICK HAMMER, Wisconsin	<i>Professor of Dairy Bacteriology</i>
BRUCE MAGILL HARRISON, Illinois	<i>Associate Professor of Zoology</i>
ANSON HAYES, Chicago	<i>Associate Professor of Analytical Chemistry</i>
HARLAN WOODBRIDGE JOHNSON, Wisconsin	<i>Associate Professor of Soils</i>
JOSEPH VANCE MCKELVEY, Cornell,	<i>Associate Professor of Mathematics</i>
MARTHA McDONALD, Chicago	<i>Instructor in Mathematics</i>
HENRY MAX McLAUGHLIN, Chicago	<i>Instructor in Chemistry</i>
CHARLES CURTIS MAJOR, Ohio	<i>Associate Professor of Mechanical Engineering</i>
ANSON MARSTON, Cornell	<i>Dean of Engineering Faculty</i>
JOHN NATHAN MARTIN, Chicago	<i>Professor of Plant Morphology</i>
IRVING E MELHUS, Wisconsin	<i>Professor of Plant Pathology</i>
ELIZABETH WILHELMINA MILLER, Chicago	<i>Professor of Home Economics and Director of Graduate Instruction in Home Economics</i>
VICTOR EMMANUEL NELSON, Wisconsin	
	<i>Assistant Professor of Physiological Chemistry</i>
RUTH O'BRIEN, Nebraska	<i>Associate Professor of Textile Chemistry</i>
RAYMOND ALLEN PEARSON, Cornell	<i>President of Iowa State College</i>
HARRY WYATT RICHEY, Chicago	<i>Professor of Pomology</i>
ADOLPH SHANE, Nebraska	<i>Professor of Trades and Industries</i>
EDWIN RAYMOND SMITH, Illinois	<i>Professor of Mathematics</i>
GEORGE WADDELL SNEDECOR, Michigan	<i>Associate Professor of Mathematics</i>
HAROLD STILES, Northwestern	<i>Associate Professor of Physics</i>
ORLAND RUSSELL SWEENEY, Ohio State	<i>Professor of Chemical Engineering</i>
ANNA HELEN TAPPAN, Cornell	<i>Assistant Professor of Mathematics</i>
GEORGE ELLSWORTH THOMPSON, Indiana	<i>Associate Professor of Physics</i>
THOMAS FRANKLIN VANCE, Iowa	<i>Associate Professor of Psychology</i>
WALTER HOUSLEY WELLHOUSE, Kansas	
	<i>Assistant Professor of Entomology and Zoology</i>
FRED CONRAD WERKINTHIN, Texas	<i>Assistant Professor of Botany</i>
CHESTER HAMLIN WERKMAN, Purdue	<i>Graduate Assistant in Bacteriology</i>
JOHN ANDERSON WILKINSON, Ohio	<i>Professor of Physical Chemistry</i>
JAY WALTER WOODROW, Colorado	<i>Professor of Physics</i>

The petitioning group of members was called to order by President McClung. Seven members of the faculty were then introduced and initiated. The initiates were as follows:

SPENCER AMBROSE BEACH

Vice-dean, Agricultural Faculty, Professor of Horticulture

SAMUEL WALKER BEYER

Dean, Faculty in Industrial Science, Professor of Geology

PERCY EDGAR BROWN

Professor of Soils

HENRY GILMAN

Associate Professor of Organic Chemistry

CHARLES MURRAY

Professor of Veterinary Research

LOUIS HERMANN PAMMEL

Professor of Botany

CHARLES HENRY STANGE

Dean, Veterinary Faculty, Professor of Veterinary Medicine

President McClung spoke emphasizing the fact that the sole function and purpose of the Society of the Sigma Xi was the encouragement and promotion of research in the sciences. He further explained the purposes and ideals of the society and the functions which should be performed by the chapter about to be installed.

Secretary Ward then detailed the steps leading up to the granting of a charter to the petitioning group, these steps being the presentation to the Executive Committee of the Sigma Xi of data furnished by the petitioners, as follows:

- I. Letter in Endorsement of the petition from the President of Iowa State College endorsed also by the President of the State Board of Education of Iowa, the governing board of the college.
- II. The record of the petitioners.
- III. A statement of the condition of the Graduate College.
- IV. A formal petition for the granting of a charter.
- V. Bulletins of the Graduate College.

He announced that the petition had been favorably recommended to the Twenty-first Convention of the Society during the Convocation Week of 1920 and that a charter had then been unanimously voted by the Convention.

The charter properly engrossed was then presented to Professor W. F. Coover, chairman of the petitioning group.

During the election of officers for the chapter the national president and secretary officiated and the following were chosen to serve for the coming year or until their successors should be duly elected and qualify.

R. E. BUCHANAN	<i>President</i>
S. W. BEYER	<i>Vice-president</i>
JOHN M. EVVARD	<i>Secretary</i>
CHARLES MURRAY	<i>Treasurer</i>

These officers were then installed. President Buchanan spoke briefly thanking the national officers for their interest in the establishment of the chapter and pledging the newly-created organization to the ideals and purposes of Sigma Xi.

In order further to acquaint the initiates with the character of the society, the constitution was read by the secretary.

As a result of a unanimous request on the part of the chapter, Dr. McClung read a cytological paper on *The Chromosome Complex*.

D. H. L. Reitz, professor of mathematics, State University of Iowa, spoke briefly. He brought greetings to Ames from the sister state institution, and emphasized the advance in research spirit that should naturally follow the installation of a chapter of Sigma Xi.

At the conclusion of these exercises the chapter adjourned to the College Inn for the installation banquet. The president of the new chapter, Professor R. E. Buchanan, presided as toastmaster and called upon the speakers. Dr. C. E. McClung responded first on The New Chapter. Mr. Wallace McKee as the representative of the other honorary societies on the campus, from all of which delegates were in attendance at the banquet, extended greetings to the newly-organized chapter of Sigma Xi. Professor A. H. Fuller spoke effectively on Aspirations. The occasion was a most enjoyable one.

Following the banquet the newly created chapter attended in a body the Sigma Xi lecture complimentary to the graduate students and faculty of the college. The chapter president, R. E. Buchanan, introduced National President McClung who made formal announcement of the establishment of the chapter at Iowa State College. The illustrated lecture on *The Story of the Alaska Salmon* was ably given by Professor H. B. Ward. The wonderful portrayal of the vicissitudes of this excellent fish in Alaska waters together with suggested means for the conservation of this great source of fish food for the generations to come revealed most clearly the practical value which frequently follows upon carefully conducted scientific studies.

The installation of the chapter of Sigma Xi has brought a new responsibility, a new inspiration, and a new ideal to our campus. Naturally the promise of the fulfillment of the purposes of the Society of Sigma Xi quickens our step, and gives us a clearer glimpse of possible accomplishments in the fields of research.

October twenty-seventh in the year of our Lord Nineteen Hundred and Twenty-One is a heyday in the annals of this land grant college.

R. E. BUCHANAN
JOHN M. EVVARD

REPORT OF FELLOWSHIP COMMITTEE

The Fellowship Committee of the Society met in New York Wednesday, October 5. By invitation of the committee President McClung and Treasurer Pegram were present. By unanimous agreement of those present, a grant of sixteen hundred dollars was made to Alexander Weinstein, Ph.D., to enable him to pursue researches at Columbia University under Professor T. H. Morgan.

Doctor Weinstein received his degree at Columbia in 1917 where he was chosen as a member of the Sigma Xi Society. He has been fellow and assistant in Zoology at Columbia and research assistant in the Carnegie Institution of Washington. His research work has been in genetics, and he has published the following articles:

Coincidence of crossing over in *Drosophila melanogaster (ampelophila)*. *Genetics*, 3, pp. 135-173 (1918).

Homologous genes and linear linkage in *Drosophila virilis*. *Proc. Nat. Acad. Sciences*, 6, pp. 625-639 (1920).

Reviews of (1) The Physical Basis of Heredity and (2) Inbreeding and Outbreeding. *Jour. Philos., Psychol., and Scientific Methods*, 11, pp. 386-390 (1920).

The award of this stipend was made after consultation with the National Research Council.

The total sum contributed for fellowships amounts to approximately \$3,100. About thirty-three per cent of the membership reached by the circulars regarding the Sigma Xi Fellowships responded with contributions, and several individuals sent a sufficiently large contribution to warrant beginning a permanent fund. Letters and comments accompanying the contributions expressed gratifying enthusiasm for the movement.

Requests for nomination of candidates for a second fellowship will shortly be issued by the Fellowship Committee, and in the coming year, with the corrected address lists now at the service of the Committee, not only will the fund be larger, but there will be also a larger nucleus for a permanent fund.

EDWARD ELLERY, *Chairman*
FLOYD K. RICHTMYER

PROGRAM OF FELLOWSHIP WORK

The process of evolution was analyzed by Darwin into three factors: variation, heredity, and survival. It was to account for differential survival that the theory of natural selection was brought forward. Darwin realized that further progress in the understanding of evolution depended on the study of variation and heredity, and he collected a large mass of data bearing on these subjects. This disclosed a great deal about the kinds of variations that occur and something about their inheritance. The statistical method of the study of heredity, which was developed later by Galton, made a more precise analysis but did not reveal the biological facts concerned with the hereditary mechanism.

In the meantime the principles of heredity had actually been discovered. Mendel, who had begun the study of the problem in 1857, published his results in 1865, several years after the appearance of the *Origin of Species*. The application of Mendel's laws might have explained many of the phenomena of heredity then known; but strangely enough these laws lay unnoticed for thirty-five years. During this time the behavior of the chromosomes in the formation of the germ cells was worked out. We now have evidence that the chromosomes carry the Mendelian factors and furnish the mechanism of inheritance. But it was not until after the re-discovery of Mendel's paper in 1900 that this relation between chromosomes and heredity factors was pointed out (Correns, Boveri, Sutton), or that the determination of sex was brought into line with Mendelism (Strasburger) and chromosome distribution (McClung, Stevens, Wilson).

The correlation between chromosomes and genes has led to great progress in the theory of heredity. This has been due largely to the work of Morgan, Sturtevant, Muller and Bridges on *Drosophila melanogaster*. In this form it has been shown that there are four groups of factors corresponding to the four pairs of chromosomes; that within each chromosome the factors are arranged in linear series; and that in the formation of the germ cells, crossing over occurs between homologous chromosomes so that entire sections of these are interchanged. The behavior of the chromosomes has been studied by an analysis of the phenomena of crossing over, especially of

"coincidence" (the influence of crossing over in one region of a chromosome on crossing over in other regions), and by the investigation of anomalous distributions of chromosomes, such as non-disjunction and triploidy. Moreover, numerous mutations have been observed and a preliminary measurement of the rate of mutation has been made.

The evidence so far obtained indicates, therefore, where genes are located and how they are distributed. But as to the nature of the gene we are still in the dark. Nor do we know what physiological processes are involved in the behavior of the chromosomes, in the interaction of genes with each other and with their environment to produce somatic characters, or in the changes in the nature of genes which we call mutations and which are the basis of evolution. Of course any solution of these problems must be, in the last analysis, physico-chemical; and unfortunately our knowledge of the physics and chemistry of living matter is not sufficient to enable us to proceed directly to a complete solution. We can, however, throw a good deal of light on the problem of using what tools we have at hand, for it should be possible by varying the conditions (genetic and environmental) to arrive at some notion of the processes involved and the nature of the genetic material.

I have planned my work on the Sigma Xi foundation with a view to contributing toward the solution of the following problems:

- (1) Rate of mutation in *Drosophila virilis*. A study of this will furnish a measure of the mutation rate and will allow a comparison with the rate in *D. melanogaster*.
- (2) Crossing over and "coincidence" in *Drosophila virilis*. The phenomenon of "coincidence of crossing over" furnishes crucial evidence on the theory of linear linkage. I have made a study of "coincidence" in *D. melanogaster* and have pointed out the bearing of the results on the interpretation of the behavior of the chromosomes, and I am investigating this phenomenon in *D. virilis* with the same end in view.
- (3) Non-disjunction in *Drosophila virilis*. Non-disjunction is a failure of the genes to segregate as they normally do. This appears at first sight an exception to the chromosome theory, but cytological evidence shows that the exceptional distribution of the genes is paralleled by the distribution of the chromosomes, so that direct

proof of the theory is afforded. I have observed both primary and secondary non-disjunction in *D. virilis* and I have planned a further analysis of these phenomena.

Experiments have been planned so that data bearing on these three problems may be obtained simultaneously.

Of course in work of this kind unexpected phenomena may occur, and the investigation of such phenomena may lead to work on problems other than those outlined.

ALEXANDER WEINSTEIN

CHAPTER REPORTS THE CHICAGO CHAPTER

During the academic year 1920-21 four scientific and business meetings were held. The first meeting for the year was held November 9. Baron Gerard DeGeer of the University of Stockholm spoke on the Introduction of the Time Factor into the Natural History of the Last Ten Thousand Years.

December 14 Mr. J. P. Minton of the Department of Physics gave an address on The Sensitivity of Normal and Defective Ears for Tones at Various Frequencies.

In the winter quarter, 1921, only one meeting was held, February 10. Professor Thomas Chrowder Chamberlain of the Department of Geology spoke on The Greater Earth.

In the spring quarter, the business meeting for the election of officers was held May 6. An illustrated lecture was given by Professor Charles J. Chamberlain of the Department of Botany. His subject was Ancient Plants. Officers were elected for the ensuing two years.

In the course of the year the following members have been elected:

ACTIVE MEMBERS—ELECTED DECEMBER 14, 1920

GRADUATES

IRA SPRAGUE BOWEN, A.B. (Oberlin College, 1919) *Physics*
Magnetic Properties of Manganese Steel. Spectra of Extreme Ultra Violet.

EDWARD TANKARD BROWN, A.B. (Univ. of Virginia, 1915) *Mathematics*
A.M. 1917

Research work preparatory to Doctor's thesis on A Fundamental System of Invariants and Covariants for the Ternary Cubic Form. Holder of traveling scholarship from the Univ. of Virginia.

ROBERT GUY BUZZARD, S.B. (Chicago, 1916) S.M. 1917 *Geography*
Geographic Study of the Hennepin Canal—Master's thesis.

EARL CLARK CASE, Ed.B. (Illinois State Normal Univ., 1914) *Geography*
The Geography of the East-Tennessee Valley (Ph.D. thesis in progress).

ETHEL FLORENCE COOPER, S.B. (Chicago, 1916) *Physiology*
Vitamine Content of Some Natural Food Stuff (in progress).

- HENRY ERWIN COPE, S.B. (Chicago, 1916) *Anatomy*
Production of Experimental Eosinophilia.
- HENRY LEON COX, S.B. (Univ. of N. Carolina, 1914) *Chemistry*
Some Derivatives of Linolic Acid.
- JAMES MILTON EGLIN, A.B. (Oberlin College, 1919) *Physics*
- FRED WILBERT EMERSON, S.B. (Earlham College, 1913) *Botany*
Root Systems of Bog Plants (unpublished).
- MARIE FARNSWORTH, S.B. (Chicago 1918) *Chemistry*
Research on the Existence of Protoactinium, on the Radioactivity of Potassium, and on the Chemical Reactions Taking Place in the Corona Discharge.
- AARON FELDMAN, S.B. (College City of New York, 1917) A.M.
(Columbia, 1919) *Chemistry*
The spreading of Liquids on Water as Related to the Surface Energy Relations of the Liquids (in progress).
- HELEN TURNBULL GILROY, A.M. (Bryn Mawr, 1912) *Physics*
Indices of Refraction of Cadmium Halides (with Dr. Getman, Bryn Mawr, 1912). Present Problem on Molecular Diameters.
- THEOPHIL PAUL GRAUER, S.B. (Chicago, 1920) *Anatomy*
Interscopular Gland of Hibernating Animals.
- MARTIN CHARLES EDWARD HANKE, S.B., (Chicago, 1918) *Chemistry*
Organic Mercuri-Arcenic Preparations (ready to publish).
- ANSON HAYES, S.B. (Drake Univ., 1908), S.M. (Iowa State Univ., 1917) *Chemistry*
Now working on Separation of the Element Chlorine into Isotopes
Earlier unpublished studies on Corrosion and Properties of Steel a Method of Making Magnesia Crucibles, etc.
- VESTUS TWIGGS JACKSON, A.B. (Mercer, 1912), S.B. (Ibid 1915), S.M. (Chicago 1916) *Chemistry*
Reaction Between Manganese Dioxide, Oxygen and Potassium Hydroxide.
- CLARENCE FIELDEN JONES, S.B. (Chicago, 1917) *Geography*
The Geography of the Pine Mountain Region in Kentucky—Ph.D. thesis in progress.
- ALFRED EDWARD JURIST, S.B. (Chicago, 1917) *Chemistry*
The Rearrangement of 9-Hydroxy-10-Ketostearic Acid and of 9-10 Diketostearic Acid.

CLARIBEL KENDALL, A.B. (Colorado, 1912), A.M. (*Ibid.*, 1914) *Mathematics*

Preassociative Syzygies in Linear Algebras—Master's thesis unpublished.
Certain Complexes and Congruences Associated with a Given Surface—
Doctor's thesis in preparation.

WILLIAM SCRIBNER KIMBALL, A.M. (Amherst, 1908) *Mathematical Physics*

Electronic Currents—Master's thesis.

ROBERT STERN LANDAUER, S.B. (Chicago, 1918) *Chemistry*
Triatomic Hydrogen. *Journal of American Chem. Soc.* Vol. XLII, 5,
May, 1920. Research on Active Gases (hydrogen and chlorine).

WEN CHAO MA, M.D. (Peking Junior College, 1915) *Anatomy*
Mitochondria in the Pancreas of the Guinea Pig.

EARLE BRENNEMAN MILLER, A.B. (Colorado, 1914), A.M.,
(Chicago, 1916) *Mathematics*

Modes of Representation of the Eight Square Theorem—Doctor's thesis.

GEORGE SPENCER MONK, S.B. (Chicago, 1914) *Physics*
Determination of Sec. Standards of Wave Length by Interference
Methods, Especially Manganese.

CLARENCE JOHN MONROE, S.B. (Chicago, 1917) *Chemistry*
Ionization of Gases in Certain Chemical Reactions.

SHINTO MOTOHASHI, M.D. (Tokyo Charity Hospital Medical
School, 1912) *Anatomy*

Kupffer Cells and Their Relation to Immunity.

ROBERT SANDERSON MULLIKEN, S.B. (Mass. Inst. of Tech.,
1917) *Chemistry*

Relation Between Intensity of Tyndall Beam and Size of Particles (with
five other authors). *Jour. Am. Chem. Society*, 41, 575 (1919). Reaction
Between Alcohols and Aqueous Solutions of Hydrochlorine.

LAWRENCE EARL McALLISTER, A.B. (Oberlin, 1916) *Physics*
The Variation in the Absorption of Nitrogen by Cocoanut Shell Charcoal.

JOHN FRANK McBRIDE, S.M. (Chicago, 1915) *Chemistry*
Research experience at the National Aniline Co., Buffalo, N. Y. Engaged in research in Organic Chemistry.

DANIEL BARTLETT MACCALLUM, S.B. (Chicago, 1920) *Anatomy*
Blood Supply of Kidney.

CYRUS COLTON MACDUFFEE, S.B. (Colgate, 1917), S.M.

(Chicago, 1920)

Mathematics

A Theory of the Complex Number System—Master's thesis. Concerning a Fundamental System of Invariants Which Characterize Non-associative Linear Algebras in a Small Number of Units—Doctoral research.

EDUARDO QUISUMBING, B.Agric. (Univ. of Philippines, 1918)

Botany

Studies of Philippine Bananas, *The Phil. Agr. Rev.* 12:1-90, pl. 1-30, 1919. Anatomy of Abaca (*Musa textilis*) (unpublished). Some Poisonous Plants of the Philippines (unpublished). Philippine Weed Seeds—Master's thesis in preparation. The Anatomy of Philippine Woods (research).

ESME EUGENE ROSAIRE, S.B. (Chicago, 1920)

Chemistry

Study of an Electrical Conductivity Method of Chemical Titration.

HAYWOOD MERRIAM SEVERANCE, S.B. (Univ. of California,

1910), S.M. (*Ibid.*, 1914)

Chemistry

Nitration Catalysis—Ph.D. thesis.

RIETTA SIMMONS, A.B. (Tulane Univ., 1915)

Psychology

Influence of Motives in Animal Learning—(work in progress).

ROBB SPAULDING SPRAY, S.B. (Purdue Univ., 1914), S.M.

(Penn State, 1917)

Bacteriology

Pneumonias in Pigs—research in progress. Observations on Paratyphoid Bacilli Recently Isolated from Animals, *Jour. Infectious Disease*, 1920, 26, pp. 340-346. Infectious Abortion of Swine (L. P. Doyle and R. S. Spray), *Jour. Infectious Diseases*, 1920, 27, pp. 165-168. Pathogenic Bacteria in Hog Cholera Blood (L. P. Doyle and R. S. Spray), *Jour. Infectious Diseases*, 1920, 27, pp. 245-249. Paratyphoids from Chicks (unpublished).

STEWART DUFFIELD SWAN, A.B. (Monmouth, 1912), A.M.

(Columbia, 1916)

Chemistry

Velocities of Saponification of Esters (in progress).

LLOYD WILLIAM TAYLOR, S.B. (Grinnell Col., 1914)

Physics

Alteration of Gas Spectra as Function of Pressure (in progress).

FRANK ERNEST ALOYSIUS THONE, S.B. (Grinnell, 1915)

Botany

Pioneer Plants, etc., Parts i-iii. Rainproof Atmometer Valve. Soil Points (unpublished).

HAROLD LINCOLN THOMPSON, A.B. (Iowa, 1919)

Anatomy

Effect of Tuberculin on Von Kupffer's Cells.

EDGAR CLEVELAND TURNER, S.B. (Grinnell, 1917), S.M. (Chi-

ago, 1920)

Physiology

Effects Low Protein Diet in the Production of War Edema.

- KARL SKILLMAN VANDYKE, S.B. (Wesleyan Univ., 1916), S.M.
 (Ibid., 1917) *Physics*
 The Quenched Spark Between Tungsten Electrodes, 1917 (unpublished).
 Viscosity and Slip Coefficients of Gases (unpublished).
- HUGO BERNARD WAHLIN, A.B. (Bethany, 1915), A.M. (Kansas,
 1916) *Physics*
 Dispersive Rotation of Plane Polarized Light in Crystals (coming).
- HOWARD WAKEFIELD, S.B. (Chicago, 1917) *Anatomy*
 Scurvy and Its Relation to the Mankowski Granules in the Acenai Cells
 of the Pancreas.
- CARL JOHN WARDEN, A.M. (Nebraska, 1916) *Psychology*
 Distribution of Effort in Animal Learning (in progress).
- IMOGENE DOLORES WILLARD, A.B. (California, 1917), S.M.
 (Chicago, 1920) *Chemistry*
 The Action of Cholro-amides on Organic Sulphides and Related Sub-
 stances.
- MARGARET FITCH WILLCOX, A.B. (Mt. Holyoke, 1919) *Chemistry*
 Derivatives of Phenylacetic Acid.

ELECTED TO ASSOCIATE MEMBERSHIP, DECEMBER 14, 1920

CLARENCE FRANK GUNSAULUS BROWN

CHARLES NEIL CAMERON	<i>Graduate Student in Physiology</i>
PATRICK ARTHUR DELANEY	<i>Graduate Student in Chemistry</i>
KENNETH HANCOCK GOODE	<i>Undergraduate Student in Anatomy</i>
SIMON HERMAN HERZFELD	<i>Undergraduate Student in Chemistry</i>
NOEL PAUL HUDSON	<i>Graduate Student in Chemistry</i>
PAUL MYRON KAUFMAN	<i>Graduate Student in Bacteriology</i>
FREDERICK WILLIAM KRANZ	<i>Undergraduate Student in Anatomy</i>
MARGARETE META HEDWIG KUNDE	<i>Graduate Student in Physiology</i>
WALTER FERDINAND LOEHWING	<i>Graduate Student in Physics</i>
BENJAMIN TELL NELSON	<i>Graduate Student in Botany</i>
JOSEPH PELC	<i>Undergraduate Student in Anatomy</i>
VERNE DONALDSON SNYDER	<i>Graduate Student in Chemistry</i>
WILLIAM BERDETT ZUKER	<i>Graduate Student in Chemistry</i>

GRADUATE STUDENTS—ELECTED FEBRUARY 10, 1921

- KELLOGG FINLEY BASCOM, S.B. (Fargo College, 1916), S.M. (Chicago, 1919), Assistant in Zoology *Zoology and Embryology* Thesis for S.M.: Distribution of Birds in the Sand Dunes of Northern Indiana. Present Research: Sex Differentiation in the Embryonic Development of Cattle.
- CHARLES HENRY BEHRE, JR., S.B. (Chicago, 1918), Assistant in Geology *Geology* Phylogony of Reptilio-Amphibian Teeth. Stratigraphy of the John Day Valley.
- LEO KEMPF CAMPBELL, S.B. (Chicago, 1920), Assistant in Physiological Chemistry *Physiological Chemistry* The Quantitative Estimation of Tryptophane in Proteins. Quantitative Studies on Indol Derivatives.
- LYMAN CHALKLEY, JR., S.B. (Chicago, 1920), Assistant Sprague Institute *Chemistry* An Indirect Method of Mercurization of Organic Compounds (Carried on and published together with Dr. Kharasch).
- ALBERT EDWIN COXE, S.B. (Chicago, 1916) *Chemistry* Research Fellow, Mellon Institute, 1918-20. Now working on the Theory and Efficiency of Ozone Production in the Electrical Discharge.
- KENNETH FOWLER, A.B. (Austin College, 1914), M.D. (Rush Medical College, 1918) *Pathology* Comparison of Bactericidal Power of the Whole Blood and the Antibodies in the Serum.
- RALPH WALDO GERARD, S.B. (Chicago, 1919) *Physiology* Studies on the Chemistry of the Toxemia of Intestinal Obstruction.
- GRANT MELVIN KLOSTER, S.B. (Chicago, 1920) *Physiological Chemistry* Quantitative Estimation of Minute Changes in Oxygen Gas Concentration. Chemistry of Edestin.
- MARGARETE META HEDWIG KUNDE, A.B. (Univ. of Nebraska, 1917), S.B. (Ibid., 1919), Assistant in Physiology *Physiology* The influence of Fasting (prolonged) on Basal Metabolism.
- HAROLD EARL MINER, S.B. (Chicago, 1920) *Mathematics and Astronomy* Ballistic Pamphlets.

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ELOISE PARSONS, A.B. (Randolph-Macon Woman's College, 1919) *Physiological Chemistry*

Studies on Pepsin and Pepsinogen.

FRANCIS PARKER SHEPARD, A.B. (Harvard, 1919), Fellow in Geology

Work on old Shore lines on Cape Ann. Work on structure of the Rocky Mountain Trench. Experiments in Developing Folds and Faults.

ELECTED TO ASSOCIATE MEMBERSHIP, FEBRUARY 10, 1921

HOWES BODFISH	<i>Graduate Student in Astronomy</i>
HARRIET CARTER,	<i>Graduate Student in Geography</i>
GEORGE BABCOCK CRESSEY	<i>Graduate Student in Geology</i>
ARTHUR CAYLEY DAVIS	<i>Graduate Student in Mathematics and Astronomy</i>
JOHN ROBERT CHARLES EVANS	<i>Graduate Student in Geology</i>
Alice Foster	<i>Graduate Student in Geography</i>
FRANCIS GRAHAM FRESE	<i>Undergraduate Student in Chemistry</i>
WALKER McCONNELL HINMAN	<i>Graduate Student in Chemistry</i>
DOROTHY JOSEPHINE KRAUSE	<i>Graduate Student in Physiology</i>
JOHN MESICK	<i>Special Student in Astronomy</i>
GAIL FRANCIS MOULTON	<i>Graduate Student in Geology</i>
ALBERT EMMETT OLDHAM	<i>Graduate Student in Geology</i>
EDITH PUTNAM PARKER	<i>Graduate Student in Geography</i>
LUCENA KNIGHT ROBINSON	<i>Graduate Student in Chemistry</i>
SAMUEL ROBERT SHUMAKER	<i>Graduate Student in Astronomy and Mathematics</i>
GRACE ANNE STEWART	<i>Graduate Student in Geology</i>
NORMAN LOUIS THOMAS	<i>Graduate Student in Geology</i>
MARGUERITE ELIZABETH UTTLEY	<i>Graduate Student in Geography</i>

ACTIVE MEMBERS

GRADUATES—ELECTED MAY 6, 1921

ALICE ALLEN BAILEY, S.B. (Nebraska, 1920) *Botany*

Vascular Anatomy of *Bowenia*.

JOHN HERBERT BEAUMONT, S.B. (Univ. of West Virginia, 1917),

Instructor, Univ. of Minn. *Botany and Horticulture*

Physiology of Ripening and Dropping of Plum. Physiology of Pollen Tube Growth in Relation to Sterility.

- SARA ELIZABETH BRANHAM, A.B. (Univ. of Colorado, 1919),
 Research Asst. in Bacteriology *Bacteriology*
 Attempts to Cultivate Filterable Viruses from Cases of Influenza and
 Common Colds (with I. C. Hall), Jour. Infect. Dis. 1921, 28 p. 143.
 Research: Filterable Viruses in Influenza and Colds.
- CLARENCE FRANK GUNSAULUS BROWN, S.B. (Chicago, 1919)
Physiology
 Research: Hypopituitarism.
- HARRIETT HULDAH FILLINGER, S.B. (Chicago, 1920) *Chemistry*
 Is now working on an experimental thesis for the Master's degree. (1)
 The Action of Sulphur Trioxide on Liquid Ammonia. (2) The Products
 of Electrolysis of Amidosulphonic Acid and Sulphamide in Liquid
 Ammonia.
- MONT ROBERTSON GABBERT, A.B. (Transylvania Col., 1915),
 A.M., 1916 *Philosophy*
 Research in process: Definitions of Consciousness. On the Psychology
 of Genius. (Professor of Philosophy and Psychology, Hiram College,
 1918-1920).
- NOEL PAUL HUDSON, A.B. (Millikin Univ., 1917) *Bacteriology*
 Research: Constancy of characteristics of the Pneumococci.
- SUMNER ALBERT IVES, S.B. (U. of Ohio, 1909), S.M., 1918
Botany
 Maturation and Germination of Seeds of Holly. Preparation of Permanent
 Mounts of Microchemical Sections. Correlation Between Weather
 Conditions and First Blossoming of 25 Species for 15 years. Morphological
 Study of Rebotilia.
- HERMAN KURZ, S.B. (Chicago, 1920) *Botany*
 Normal and Traumatic Tissue in Encephalartos. A Study of Seasonal
 Changes in Soil Acidity.
- PATSY HUGHES LUPO, A.B. (Mt. Holyoke, 1918) *Botany*
 Formation of Spores in Hypoxylon.
- BENJAMIN TELL NELSON, S.B. (Chicago, 1920) *Anatomy*
 Compensatory Hypertrophy of the Kidney.
- LOUISA ELLA RHINE, S.B. (Chicago, 1919), S.M., 1921 *Botany*
 Microchemical Studies of Seasonal Changes in Oak and Lilac Buds.
- JOHN JOSEPH ZAVERTNIK, S.B. (Chicago, 1920) *Anatomy*
 The Nature and the Absorptive Powers of the Foreign Substances Injected
 Subcutaneously.

ELECTED TO ASSOCIATE MEMBERSHIP, MAY 6, 1921

NATHANIEL JOHN BEABER	<i>Graduate Student in Chemistry</i>
RACHEL FULLER BROWN	<i>Graduate Student in Chemistry</i>
BENJAMIN BURTON COX	<i>Undergraduate Student in Geology and Geography</i>
DONALD J. MUNROE	<i>Undergraduate Student in Geology</i>
RAE PREECE	<i>Undergraduate Student in Geology</i>
TOWNER BOWDITCH ROOT	<i>Undergraduate Student in Geology</i>
BEN BELL ROSEN	<i>Undergraduate Student in Physics</i>
JOSE HABIGHTING SANTOS	<i>Undergraduate Student in Botany</i>
LLOYD SCHMIEDESKAMP	<i>Undergraduate Student in Physics</i>
ALFRED WALTER SIMON	<i>Undergraduate Student in Physics</i>
MARY CAROLINE TAYLOR	<i>Undergraduate Student in Physics</i>
WALTER ELSWORTH WYNNE	<i>Graduate Student in Geology</i>

THE MICHIGAN CHAPTER

The following meetings have been held by the chapter during the past academic year:

December 17, 1920. A lecture by Professor Alfred Lloyd, dean of the Graduate School on The University Policy in Relation to Research. This lecture was followed by a short business meeting at which the chapter authorized changes in the by-laws providing for the election of associate members in accordance with the general constitution of the Society.

April 20, 1921. The Sigma Xi was invited to the Annual Memorial Meeting of the University Research Club. At this meeting papers in commemoration of the centennials of Helmholtz and Virchow were read by Professor L. C. Karpinski, Professor C. V. Weller, and Professor Arthur Boak.

June 2, 1921. The annual banquet and initiation at which Professor John C. Parker, the out-going president of the chapter, spoke on the subject, Research—an Outside View. At this meeting officers were elected for the next biennium.

During the year the chapter has had a committee working on a revision of the by-laws by which it is hoped the activity of the chapter may be increased. Action will be taken on the revised by-laws in the fall. A joint committee of the Junior Research Club and the Sigma Xi has been at work formulating plans by which

the two societies might cooperate in the future. The plan suggested for next year is that three joint meetings be held. The committee has also expressed itself in favor of the ultimate union of the two societies under some arrangement that will permit of their continued independent organization.

The following members were initiated at the annual meeting:

ELECTED TO FULL MEMBERSHIP
UNDERGRADUATES

BERNARD LAMBERT BECKWITH *Mechanical Engineering*
Interested in problems connected with power plants.

ROYAL CARL BERGVALL *Electrical Engineering*
Interested in the application of economic principles in connection with power plant design.

LESTER KING FERRIS *Mechanical Engineering*

JAMES SHERMAN GAULT *Electrical Engineering*
Work in connection with the physical interpretation of complex mathematical problems.

GEORGE KELLOGG HESS *Electrical Engineering*
Interested in the theory of electricity and magnetism and in mathematical physics.

EDWARD FREDERICK MOORE *Mechanical Engineering*
Interested in mechanical and hydraulic engineering.

ALLEN CHRONISTER STARRY *Medicine*
Research in pathology. Publications in collaboration with Dr. A. S. Warthin: A more rapid and Improved Method of Demonstrating Spirochetes in Tissue, Amer. Journ. Syph. 4, p. 97, Jan. 1920. Second Improved Method for the Demonstration of Spirochaeta Pallida in Tissues, Journ. Amer. Med. Assoc., 76, p. 234, Jan., 1921.

INGLE BURGESS WHINERY *Mechanical Engineering*
Interested in the phenomena involved in the cutting of metals.

GRADUATES

ARTHUR LYNN BECKER, B.S., M.A. (Albion, 1903, 1910) *Physics*
Instructor of Physics. Research in spectroscopy. Exploded Wire Spectra of Calcium, ready for publication.

GEORGE WILLIAM COLLINS, Ph.B., Ph.C., Ph.G., (St. Louis Col. of Pharmacy, 1910, 1912, 1914), B.S. (Phar.) (Univ. of Mich., 1919), M.S. (Ibid., 1920) *Medicine*

Assistant in Hygienic Laboratory. Research in Biological Chemistry. Publication: Botulism from Canned Olives. *Journ. of Lab. and Clin. Medicine*, 5, No. 9, June, 1920.

FRANK BOYD COTNER, A.B., A.M. (Univ. of Mich., 1916, 1917) *Botany*

Graduate Assistant in Botany. Research along the line of mycology and plant pathology.

JAMES FERDINAND FAIRMAN, B.S. (E.E.) (Univ. of Mich., 1918) *Electrical Engineering*

Instructor in Electrical Engineering. Investigation of the applicability of the Heyland circle diagram to induction motor design.

ROSS GUNN, B.S. (E.E.) Univ. of Mich., 1920 *Physics*

Development work in connection with commercial radio work. Investigations on the use of the chaffee gap in radio work.

RUTH HARRIET HAYES, B.S. (Ill. Wesleyan Univ., 1917) *Botany*

Cytology. Study of chromosome reduction in a plant type.

RUSSELL CLAUDIUS HUSSEY, A.B. (Univ. of Mich., 1911) *Geology*

Paleontology-Ordovician of Michigan. Descriptions of Some New Fossils from the Devonian of Michigan (with G. M. Ehlers), in press.

JOAQUIN MEJORADA MARANON, B.S. (Phar.) (Univ. of the Philippines, 1916), M.S. (Univ. of Mich., 1921) *Botany*

Plant Biochemistry. Research on the chemical basis of disease resistance in Oenothera.

CLEMENT HOOVEN MARSHALL, B.S., M.D. (Univ. of Mich. 1916, 1918) *Medicine*

Senior Instructor in Dermatology. Publications: Anal Chancre Resulting from Pederasty, *Amer. Journ. of Syphilis*, 3, no. 3, July, 1919. A Study of the Spinal Fluid in One Thousand Eight Hundred and Sixty-nine Cases of Syphilis in All Stages, *Archives of Dermatology and Syphilology*, 3, pp. 272-278, March, 1921. Visceral Syphilis, Syphilis of the Lung. In press.

SAMUEL RAYNOLES PARSONS, B.S. (Mass. Agr. College, 1911), M.S. (Penn. State College, 1915) *Physics*

Aeronautics. Publications: Technical Reports of the National Advisory Committee for Aeronautics, as follows: no. 86, Properties of Special

Types of Radiators; no. 88, Pressure Drop in Radiator Air Tubes; no. 106, Turbulence in the Air Tubes of Radiators for Aircraft Engines. Joint author of the following reports: no. 61, Head Resistance Due To Radiators; no. 62, Effect of Altitude on Radiator Performance; no. 87, Effects of Nature of Cooling Surface on Radiator Performance.

ESTHER ANNIE PEARL, B.A. (Albion College, 1920) *Mathematics*
Interested in pure mathematics.

ERNEST REED, A.B., M.S. (Univ. of Mich., 1917, 1919) *Botany*
Plant Breeder, U. S. Department of Agriculture. Line of work, plant physiology and genetics. Special investigations on the genetics of the sugar beet.

EVELYN HORTENSE ROBERTS, A.B. (Univ. of Mich., 1915) *Physics*
A Method for Determining the Annealing Temperature of Glass (with J. T. Littleton), Amer. Optical Soc. Journ., August, 1920. To be republished in the Amer. Ceramic Soc. Journ.

LAWRENCE BUNTING SIMS, B.S.E. (Univ. of Mich., 1920)
Chemistry

Physical chemistry. Research on the Theory of the Swelling of Gels, almost ready for publication.

HERSCHEL C. SMITH, A.B., B.C.E. (Univ. of Mich., 1913,
1915) *Civil Engineering*

Research on the problems of highway transportation.

JOHN VAN OOSTEN, A.B. (Univ. of Mich., 1918) *Zoology*
Assistant in zoology. Work in progress on life histories of Coregonine fishes.

GERRIT VAN ZYL, A.B. (Hope College, 1918), M.S. (Univ. of Mich., 1920) *Chemistry*

Teaching assistant in general chemistry. Interested in Physical Chemistry.

FACULTY

FELIX GUSTAV GUSTAFSON, A.B. (Univ. of Wis., 1915), M.A.
(Harvard University, 1919) *Instructor in Botany*
Plant physiology. Publications: The Effect of Anesthetics and Other Substances on the Respiration of *Aspergillus Niger*, Journ. Gen. Physiol., 1918. The Effect of Antagonistic Salts on the Respiration of *Aspergillus Niger*, Journ. Gen. Physiol., 1919. The Effect of Hydrogen Ion Concentration on the Respiration of *Penicillium Chrysogenum*, Journ. Gen. Physiol., 1920. A Comparison of the Production of CO₂ by Penicillium and by a Solution of Dextrose and Hydrogen Peroxide, Journ. Gen. Physiol., 1920.

ELECTED TO ASSOCIATE MEMBERSHIP

GRADUATES

FRED R. CLARK, A.B. (Univ. of Mich., 1920) *Botany*
 Systematic Botany. At work on bud formation in plant hypocotyls.
 Assistant in botany.

CHARLES WILLIAM CREASER, A.B. (Univ. of Mich., 1920) *Zoology*
 Ichthyology. At work on a systematic study of American lampreys
 including a study of their distribution. Assistant in zoology.

ERNEST EDWARD DALE, A.B. (Univ. of Neb., 1913), M.S.
 (Kansas State Agr. College, 1920) *Botany*
 Plant breeding. Now working on the genetics of peppers. Assistant in
 botany.

MELVILLE HARRISON HATCH, A.B. (Univ. of Mich., 1919) *Zoology*
 Systematic zoology and geographical distribution. At work on the science
 of the Coleopteral beetles. Assistant in zoology.

CLEVELAND PENDLETON HICKMAN, A.B. (Salem College, 1917),
 A. M. (Univ. of Mich., 1920) *Zoology*
 Animal Ecology and Behavior. Assistant in zoology.

THEODORE HUNTINGTON HUBBELL, A.B. (Univ. of Mich.,
 1920) *Zoology*
 Entomology. Orthoptera of Berrien County, Michigan (in press).
 Assistant in the Museum of Zoology, Univ. of Michigan.

ARTHUR IRVING ORTENBURGER, A.B. (Univ. of Mich., 1920)
Zoology
 Herpetology. A Collection of Reptiles and Amphibians from Southern
 Indiana (in press). Fellow in zoology, Univ. of Mich.

HARRY LAVERNE SMITH, B.S. (Univ. of Mich., 1919) *Physics*
 Spark spectra in gases. Infra-red photography. Assistant professor
 of physics, Michigan State Normal College, Ypsilanti, Mich.

UNDERGRADUATES

LEIGH CHARLES ANDERSON	<i>Chemistry</i>
FRED WILLIAM BARTLETT	<i>Minerology</i>
DOW VAWTER BAXTER	<i>Botany, Forest Pathology</i>
BARNET BREZNER	<i>Civil Engineering</i>
MARK BERTRAM COVELL, JR.,	<i>Electrical Engineering</i>
WILLIAM LAVILLA FINK	<i>Chemical Engineering</i>
LAURANCE EWING FROST	<i>Electrical Engineering</i>
LAURENCE McKINLEY GOULD	<i>Geology</i>
FRANCES LOUISE GRAVES	<i>Botany</i>

THEODORE RITSON HALMAN	<i>Electrical Engineering</i>
LEIGH HOADLEY	<i>Zoology</i>
ALLIS FOUNTAIN HUSSEY	<i>Forestry</i>
ERNEST RAYMOND JOHNSON	<i>Chemical Engineering</i>
GEORGE DONALD KENNEDY	<i>Civil Engineering</i>
LAWRENCE AUGUST PHILIPP	<i>Chemical Engineering</i>
JOHN HENRY PILKINGTON	<i>Electrical Engineering</i>
SAMUEL DOAK PORTER	<i>Civil Engineering</i>
MALCOLM HERMAN SOULE	<i>Chemistry</i>
VARNUM BERT STEINBAUGH	<i>Civil Engineering</i>
WALTER CLIFFORD STINSON	<i>Civil Engineering</i>
DONALEE LEVI TABERN	<i>Chemistry</i>
LEWIS EDGAR WEHMAYER	<i>Botany</i>

THE BROWN CHAPTER DURING 1920-21

The Brown Chapter held five meetings in the academic year 1920-21. At the first meeting Professor H. E. Walter addressed the chapter on the subject of *Drosophila*, the Biological Cinderella, illustrating his lecture by numerous diagrams. The second meeting was devoted to business only. On December 8 a public lecture was given under the auspices of the Society, the lecturer being Professor Charles R. Stockard of Cornell Medical College of New York, who spoke on the Rate of Growth and Quality of Structure. About two hundred were present. At the fourth meeting the chapter, with the Providence Engineering Society as guests, listened to a lecture by Professor Harvey N. Davis of Harvard University on the subject of Cryogenic Engineering. At the fifth meeting were held the annual initiation and banquet. The speakers at the banquet were Dr. Baitzell, representing the Yale Chapter, and Dr. Plimpton, representing the Worcester Chapter. The address of the evening was given by Dr. Oscar Riddle of the Carnegie Institution of Washington, his subject being Sex Determination.

The following were initiated into membership:

FROM THE FACULTY

ROBERT WILBUR BURGESS, Ph.D.

Assistant Professor of Mathematics

Uniform Motion of a Sphere Through a Viscous Liquid, *Am. Jour. Math.*, Jan., 1916. A Comparison of a Certain Case of the Elastic Curve

with its Approximation, *Phys. Rev.*, March, 1917. The Record of the American Rhodes Scholars; A Statistical Study, *The American Oxonian*, Jan., 1921. Various Abstracts and Reviews.

RICHARD MONTGOMERY FIELD, Ph.D. *Assistant Professor of Geology*

The Use of the Roentgen Ray in Paleontology. *Skigraphy of Fossils*, Am. Jour. of Science, May, 1915. On the Validity of the Genus *Plethopteris* (Raymond). A Preliminary Paper on the Origin and Classification of Intraformational Conglomerates and Breccias, Ottawa Naturalist, May, June, July, Aug., Sept., 1916. The Middle Ordovician of Central and South Central Pennsylvania, Am. Jour. of Science, Dec., 1919. Investigations Regarding the Calcium Carbonate Oozes at Tortugas, and the Beach-Rock at Loggerhead Key, Yearbook 18 of the Carnegie Institution. The Use of the Term Fossil (two papers), *Science*, v. 51 and 53.

FROM GRADUATE STUDENTS

JOHN EDWARD BLAIR, A.B.

Biology

Study of Intestinal Flow in White Rats.

NATHANIEL ORSON HOWARD, Sc.M.

Botany

Urea as a Source of Nitrogen for Plants. Thesis for Sc.M. (1917). Sap Stain, Mold, and Incipient Decay in Green Wood, with Special Reference to Vehicle Stock. (In press, Gov't. Printing Office.)

CARLETON SOUTHWICK SPEAR, Sc.M.

Organic Chemistry

Preliminary investigations for thesis for Ph.D.

RALPH EVANS STANTON, Ph.B.

Biology

The Alkali Reserve in Pellagra (with M. X. Sullivan), Arch. Int. Med., 26: 41-48, 1920. Metabolism in Pellagra: A Study of the Urin (with M. X. Sullivan and P. R. Dawson), Arch. Med., 27: 387-405, 1921.

FROM THE UNDERGRADUATES

WAYNE MOODY FAUNCE

HAROLD EINAR MAGNUSON

CHARLES JOHN FISH

VINCENT MILLARD MESERVE

ARCADIE GIURA

REGINALD MARCY PEASE

WILLIAM WORTH HALL

HAROLD LINCOLN SHELDON

FRED LORIN ITSCHNER

EVERETT LEPRILETTE SWEET

KNOWLTON MEAD WOODIN

T. H. BROWN, R. F. BORDEN, *Secretaries*

THE ILLINOIS CHAPTER

During the academic year 1920-1921 the Illinois Chapter has conducted nine meetings for the presentation of scientific papers and

has added twenty-nine active and fifty-four associate members to its roll by election.

In addition to the regular monthly meetings one open meeting was provided by the chapter in the annual address on May 2 before the societies of Phi Beta Kappa and Sigma Xi. Professor William F. Durand of Leland Stanford Junior University delivered this address using as his subject "Science and Civilization." Following the monthly business meetings the addresses listed below were presented:

October—Robert Graham, Botulism and Botulinus Antitoxin.

November—Arnold Emch, Visualization in Mathematics.

December—Howard B. Lewis, Recent Studies on the Rôle of the Proteins in Nutrition.

January—Six representative reports by members of the chapter upon papers presented before the sections of the American Association and affiliated societies, Chicago meeting.

February—Coleman R. Griffith, The Behavior of White Rats Under Prolonged Rotation.

March—F. R. Watson, The Intensity of Sound.

April—A. C. Willard, Research Problems Involved in Studying the Performance of Warm Air Furnaces Operating by Natural Circulation.

May—Herbert F. Moore, The Presentation of the Results of Scientific Research, address of retiring president.

Elections of members were held in November and in May, resulting in the addition of the following to the list of members:

ACTIVE MEMBERS FROM THE FACULTY

MARY GERTRUDE HASEMAN, Ph.D.

Mathematics

On Knots, with a Census of the Amphicheirals with Twelve Crossings. Trans. Royal Soc. Edinburgh, 52: 235-255. Amphicheiral Knots Trans. Royal Soc. Edinburgh, 52: 597-602.

RALPH STANLEE FANNING, B.Arch., M.S.

Architecture

Reconstruction of Devastated France (Parts I to VI), The Amer. Arch., Aug., 1920-Jan., 1921. Colonial Remains, Eastern Long Island, Amer. Arch., Dec., 1916. The Console, Arch. Record, Oct., 1917. (Numerous other papers).

ISAIAH PILOT, M.D., B.S.

Pathology

The Streptococci of the Actinomyces-like Granules of the Tonsils, *Jour. Inf. Diseases*, 23: 562-568. Pandemic Influenza and Pneumonia in a Large Civil Hospital, *Jour. Amer. Med. Assoc.*, 71: 1562-1565. Hemolytic Streptococci of the Faucial Tonsils, *Jour. Inf. Diseases*, 24:386. (And other papers.)

ACTIVE MEMBERS FROM FORMER ASSOCIATES—GRADUATE STUDENTS

LYELL JAY THOMAS, B.S.

Zoology

The Morphology of the Otocysts in Gonionemus. *Biological Bull.* (In press.) The Male of *Trichosomoides Crassicauda* (Bellingham, 1843) (thesis for M.A.)

IRVING ALSON DENISON, B.A.

Agronomy

The Nature of Certain Aluminum Compounds in the Soil and Their Influence on Ammonification and Nitrification (thesis for M.S.)

JACOBUS STEPHANUS MARAIS, B.A.

Agronomy

The Comparative Agricultural Value of Insoluble Mineral Phosphates of Aluminum, Iron, and Calcium (thesis for Ph.D.)

GEORGE HOPKINS COLEMAN, B.S., M.S.

Chemistry

The Action of Nitrogen Trichloride on Ethyl Chloride, Benzene, Toluene, and Benzyl Chloride (thesis for Ph.D.)

CHARLES FRANCIS HILL, A.B., A.M.

Physics

The Measurement of Mercury Vapor Pressure by Means of the Knudsen Pressure Gauge (thesis for Ph.D.)

WILLIAM EDMUND EDINGTON, A.B.

Mathematics

Abstract Group Definitions and Applications (thesis for Ph.D.)

BEULAH MAY ARMSTRONG, A.B., A.M.

Mathematics

Proof by Mathematical Induction in Group Theory (thesis for Ph.D.)

ACTIVE MEMBERS FROM GRADUATE STUDENTS

CHARLES SHATTUCK PALMER, B.S., M.S.

Chemistry

Reaction of the Arsines, I. Condensation of Primary Arsines with Aldehydes, *Jour. Amer. Chem. Soc.*, Nov., 1920.

ARMAND JAMES QUICK, B.S., M.S.

Chemistry

The Preparation of P-Phenylenediamine and Aniline from their Corresponding Chlorobenzenes, *Jour. Amer. Chem. Soc.*, 42, May, 1920. A Study of Cobaltous Ammines (by Clark, Quick, and Harkins, in press).

HARRY FAGAN YANCEY, A.B., A.M.

Chemistry

Distribution of the Forms of Sulphur in Coal Seams, (in press). (Three other papers.)

- MAX SHAW DUNN, A.B., M.S. *Chemistry*
Studies in Uric Acid Metabolism, II, *Jour. Biol. Chem.*, 36: 9-26 (with H. B. Lewis and E. A. Doisy). Deaminized Protein, Preparation, Properties, and Metabolic Behavior (thesis for Ph.D.)
- JOHN ABERDEEN GUNTON, A.B., A.M. *Chemistry*
A Revision of the Proximate Analysis of *Rhamnus Frangula* (thesis for Ph.D.)
- MANSON JAMES BRADLEY, A.B., M.S. *Chemistry*
A Study of Decomposition Processes Applicable to Certain Products of Coal Carbonization (thesis for Ph.D.)
- FRANK HOWARD DRIGGS, A.B. *Chemistry*
The Purification of Holmium (thesis for A.M.)
- LEWIS BRADFORD RIPLEY, B.S., M.S. *Entomology*
The Morphology and Postembryology of Noctuid Larvae (thesis for Ph.D.)
- FENNER SATTERTHWAITE STICKNEY, B.S., M.S. *Entomology*
The Head Capsule of Coleoptera (thesis for Ph.D.)
- GLADYS HOKE, B.S. *Entomology*
Some New Lepidosaphine Scales (Hemiptera) (in press). Anatomy of the Head and Mouth-parts of Plecoptera (thesis for M.S.)
- CECIL FREDERICK PATTERSON, B.S., M.S. *Botany*
Growth in Relation to Relative Humidity and Temperature (thesis for Ph.D.)
- CLARENCE CHARLES SALEHOF, B.S., M.S. *Pathology*
Correlation of Rabbit Pneumonia and Human Influenza Pneumonia (in press). Influence of X-ray Stimulation on Coagulation Mechanism (in press). Three additional papers joint with W. F. Peterson.
- ADOLPH KRAFT, B.S., M.S. *Pathology*
Influence of Carbohydrates and Fats on Nitrogen Equilibrium, III. *Med. Jour.*, April, 1920. Hemolytic Streptococci of the Appendix Vermiformis, *Jour. Inf. Diseases*, 28: 122-126. The Action of Drugs in Infection, I. Morphine in Experimental Septicemia (in press).
- WILLIAM BARBOUT NEVENS, B.S. *Animal Husbandry*
The Amino Acid Contents and Nutritive Value of the Proteins of Cottonseed Meal (thesis for Ph.D.). The Amino Acid Contents of the Proteins of Feeding Stuffs (with T. S. Hamilton and H. S. Grindley (in press). The Growth Requirements of Dairy Heifers (in press).
- MARVIN CURTIS NICHOLS, B.S. *Theoretical and Applied Mechanics*
Numerous experiment station bulletins and magazine articles.
The Relation of Fine Aggregate to the Properties of Concrete (thesis for M. S.)

REX LENOI BROWN, B. S. *Theoretical and Applied Mechanics*
The Relation of Water Content and Consistency to the Properties of
Concrete (thesis for M.S.)

THOMAS FRASER, B.S. *Mining Engineering*
A Study of Bituminous Coal Washing Methods (thesis for degree of
Engineer of Mines). Some Factors that Affect the Washability of a
Coal (in press).

TAGE ULRICH HOLTER ELLINGER *Genetics*
Conspicuum Faunæ Groenlandicæ, Protozoa, Meddeleiser om Groen-
land. Nogle danske Rhizopodes og Heliozoer Videnskabelige, Med-
deleher fra Dansk Naturhistorisk Forening. (Several other pages on
Zoology and Genetics.)

ERNEST ATKINS WILDMAN, B.S., M.S. *Chemistry*
Synthesis in the Diphenyl Methane Series (with L. Thorpe), Jour. Amer.
Chem. Soc., 37: 372-377. Preparation of 1, 2-Cichloroether (with L.
Thorpe), Jour. Amer. Chem. Soc., 41: 1122 (with L. Thorpe). A
series of six patents.

ASSOCIATE MEMBERS FROM GRADUATE STUDENTS

MARCUS M. ALICANTE, B.S. *Agronomy*

LETHE ELEANORA MORRISON, B.S. *Bacteriology*
Thermophilic Bacteria in Water (thesis for M.S.)

CHARLEY LYMAN PORTER, B.S., A.B. *Botany*
Observations on the Thermal Death Point of Certain Mold Spores (thesis
for A.M.)

HAROLD ROSS McLARTY, A.B., A.M. *Botany*
A Suspected Mosaic of Sweet Clover (in press).

EMIL FREDERICK GUBA, B.S. *Botany*
Effect of Dormant Lime Sulphur on the Control of Apple Blotch (in
press). Phyllosticta Leaf-spot and Damping-off of Snap-dragons (thesis
for A.M.)

AARON RAYMOND KIENHOLZ, B.S., M.S. *Botany*

HARRY MILTON MILLER, B.S. *Zoology*

MYRON THOMAS TOWNSEND, B.S. *Zoology*
Reactions of Aequorea (in press, with A. O. Weese).

ANNETTE BARON, B.A., M.A. *Psychology*

ADAM ARTHUR CHRISTMAN, B.S., M.S. *Chemistry*
A Study of Some Factors Which Influence the Activity of Esterase.

- WALTHER FRIEDERICK GOEBEL, A.B. Chemistry
A Study of the Catalytic Effect of Acetic Acid upon the Formation of Acetamide from Ammonium Acetate (thesis for A.M.)
- BENJAMIN RACZKOWSKI HARRIS, B.S. Chemistry
Five articles in Jour. Amer. Chem. Soc., with L. J. Curtman.
- JOHN BALFOUR OSBORN, A.B. Agronomy
ANTON ERIC ROMYN, B.S., M.S. Animal Husbandry
BENJAMIN ANDREW STIRITZ, B.S. Dairy
A Comparison of the Butterfat Content and Total Solids Content of Creams of Varying Richness Separated from the Sample of Milk, Jour. Dairy Sci., 3: 522-528.
- VEDA FERN LEONARD, A.B. Zoology
Distribution of Animal Life in Africa (thesis for A.M.)
- ROY LEWIS MAYHEW, B.S., M.S. Zoology
RUDOLPH STOKES NELSON, B.S. Chemistry
WALLACE HUME CAROTHERS, B.S. Chemistry
LUCIE EMMA ROOT, A.B., M.S. Chemistry
Amino Acid Synthesis in the Animal Organism. Can Norleucine Replace Lysine for the Nutritive Requirements of the White Rat? Jour. Bio. Chem., 43: 79-87. The Oxidation of Cystine in the Animal Body. Proc. Soc. Biol. Chem., Jour. Biol. Chem., March, 1921.
- EARL AGARD ENGLE, A.B., A.M. Chemistry
FLOYD BEATTY HOBART, B.S. Chemistry
The Influence of Oxygen and Carbon Dioxide on the Caking Properties of Coal (thesis for M.S.)
- GEORGE HARLAN DUNGAN, B.S. Botany
The Imhibition of Water as Affected by Environmental Factors (thesis for M.S.). A series of 4 Agr. Exp. Station Circulars.
- MILDRED LEE ECKI, A.B. Mathematics
Statistical Study of Student Measurements (thesis for A.M.)
- ELIZABETH EASTON STICKNEY, A.B., A.M. Mathematics
HARVEY PIERSON PETTIT, A.B., A.M. Mathematics
ROYAL ALEXANDER BRINK, B.S. Genetics
JOSEPH SHIRO, B.S. Genetics
LEOPOLDO SUDANO CLEMENTE, B.S. Genetics
Studies on Inbreeding in Swine (thesis for M.S.)
- CLARENCE CARL SCHMIDT, A.B. Physics

JANE MARIE LEICHSENRING, B.S., M.S. *Physiology*

A series of 5 papers with W. E. Burge in Amer. Jour. Physiology.

FLORENCE DOROTHY JONES, A.B. *Education*

Some Psychological Factors Affecting Spelling (thesis for A.M.)

ASSOCIATE MEMBERS FROM UNDERGRADUATES

MARIE BELLE McCABE *Zoology*

MILDRED SOWERS *Psychology*

DOROTHY BRIGGS *Mathematics*

JOHN HENRY MACGILLIVRAY *Horticulture*

HERMANN C. HECKEL *Chemistry*

Synthesis of Saliginin (thesis for B.S.)

VANDERVEER VOORHEES *Chemical Engineering*

A New Method of Preparation for Allyl Esters (thesis for B.S.)

FORREST EVERETT KENDALL *Chemistry*

The Catalytic Oxidation of Methane (thesis for B.S.)

CLARENCE B. LOVELL *Chemical Engineering*

The Effect of Non-electrolytes on the Solvent Power of Water (thesis for B.S.)

CHARLES CHAUNCEY RUSSELL *Chemical Engineering*

RALPH TALBOT DECKER *Chemistry*

Use of Basic Lead Acetate in a Cleaning Agent for Sugar Solutions (thesis for B.S.)

MAURICE CROUSHORNE CREW *Chemical Engineering*

The Solubility of Certain Rare Earth Salts (thesis for B.S.)

RAYMOND COLONIUS KILLEFER *Chemistry*

The Resolution of Amino Acids Through the Biomocamphorsulfuramides (thesis for B.S.)

HENRY GEORGE BERGER *Chemistry*

The Preparation of Secondary Amines from Calcium Cyanamide (thesis for B.S.)

GEORGE CORNELIUS RUBLE *Chemical Engineering*

A Study of the Methods of Reducing Carnotite Ores (thesis for B.S.)

RALPH KENNY HAMILTON *Chemistry*

The Electrode Potential of Manganese (thesis for B.S.)

EVERETT LOUIE JOHNSON *Agriculture*

FRANK PAUL SANMANN *Agriculture*

MARTIN FRISCH

*Mechanical Engineering*The Effect of Over-stress of Steel on its Resistance to Repeated Stress
(thesis for B.S.)

JOHN ALONZO GOFF

*Mechanical Engineering*The Effect of Fillets on the Resistance of Steel to Repeated Stress
(thesis for B.S.)

IVAN LYLE HAAG

Chemistry

WILLIAM BULTMAN HOLTON

Chemistry

Artificial Gems with Rare Earth Colors (thesis for B.S.)

HARVEY EDGAR BREWBAKER

*Agriculture*H. J. VAN CLEAVE, *Secretary*

THE NORTH DAKOTA CHAPTER

Three scientific meetings were held during the year 1920-21. At the first meeting Dr. H. J. Humpstone, of the Department of Psychology, read a paper on Sex Differences in Mental Tests. The experiments on which the paper was based were made on two hundred and fifty college sophomores about equally divided between sexes, and consisted of tests in fundamental mental abilities from the maximum, minimum and the mean scores and from the mean variation. It was evident that there were no essential sex differences in the performance of the students in these tests and that the fundamental notion of sex difference in the common processes is not due to congenital competency but to environmental factors.

At the second meeting Dr. Karl H. Fussler, of the Department of Physics, gave a paper on Radium, Its Family and Its Rays. A general review of the work which has been done in the field of radioactivity was given together with a discussion of the properties of the radio-elements. Radium was discussed as to its chemical and physical properties, the sources and processes used in obtaining it and its use in commercial fields and in radio-therapy.

The paper of the last meeting was given by Dr. H. E. Leonard, of the Department of Geology. The subject was The Lignite Deposits of North Dakota. Dr. Leonard stated that the coal beds of North Dakota are of early Tertiary age and are confined to the Fort Union and Lance formations, by far the greater number occurring in the Fort Union, and that these fields cover an area of approximately 32,000 square miles. He also stated that the aggregate

thickness of the lignite in the twenty-one beds is 157 feet and that the coal of North Dakota is a brown lignite which is generally conspicuously woody in appearance and exhibits clearly the grain of the wood and that portions of flattened trunks and branches are often found in the lignite, looking not unlike the original wood, except for the brown color.

The following persons were elected associate members and the basis for election is given in each case:

UNDERGRADUATE

HAROLD N. KA DELL

Electrical Engineering

Patent for Carbon Girds in Storage Cells.

GRADUATE

MANSELL RICHARDS, B.S.

Chemistry

Ionization of Soap Solutions (Thesis for M.S.)

THE YALE CHAPTER—1920-1921

November 17, 1920. Dr. Francis G. Benedict, director of the Carnegie Nutrition Laboratory of Boston, on the subject of Calories for Children. A lecture on the work of the Carnegie Laboratory in determining the energy required per unit time for "maintenance in a state of perfect rest" of children of all ages up to 18 years.

December 16, 1920. Professor Herbert E. Gregory, Silliman professor of Geology, Yale University, on the subject of Scientific Work in the Pacific. A lecture on research, largely of a geologic nature, conducted by the speaker in the South Pacific.

January 27, 1921. Dr. Edwin E. Slosson, literary editor of *The Independent*, on the subject of The Fall of Energy and the Rise of Man. A lecture, or rather the nucleus for one, on the relations between the rise of civilization and the increase of entropy of the Stellar Galaxy.

March 4, 1921. Professor Albert T. Clay, William M. Laffan professor of Assyriology and Babylonian Literature in Yale University, on the subject of Mesopotamia and Early Babylonian Civilization. A lecture on the developments of recent excavations in the region between the Tigris and Euphrates rivers.

March 12, 1921. Initiation address by Dr. Clarence Erwin McClung, professor of Zoology, University of Pennsylvania, Presi-

dent of the National Society of Sigma Xi, on the subject of Fellowship in Research.

May 13, 1921. Professor Frank Schlesinger, director of the Yale Observatory, on the subject of The Distances of the stars. A brief description on the measurements and magnitudes of stellar distances.

During the year the following were elected members of Sigma Xi:

FACULTY

JOHN JOHNSTON, Sc.D.

Professor of Chemistry

The Determination of Carbonic Acid, Combined and Free, in Solution, Particularly in Natural Waters, *Jour. Am. Chem. Soc.*, 38, 947-75 (1916). Some Aspects of Recent High Pressure Investigation, *J. Franklin Inst.*, 1-32 (1917).

FRANK SCHLESINGER, Ph.D., Sc.D.

Director of the Observatory (Astronomy)

Photographic Determination of Stellar Parallaxes with the Yerkes Telescope. *Astrophysical Journal* 1910 and 1911. Comparative Study of Visual and Spectroscopic Binaries. (In Publications of the Allegheny Observatory.)

ABRAHAM NOWELL CREADICK, M.D.

Assistant Professor of Obstetrics and Gynecology

Frequency and Significance of Omphalitis, *Surg. Gynec. and Obstet.*, 30: 278-283, March, 1920.

HAROLD HIBBERT, Ph.D., Sc.D. *Assistant Professor in Chemistry*

The Recovery of Potash from Blast Furnace Gasses, *Journal Chem. and Metal Engin.*, 21: 723-726, Dec., 1919. Chemical Research and Industry. *Journal of Commerce Annual*, Feb. 24, 1920. A Plea for the Scientific Study of Cellulose Chemistry. *Jrl. Chem. and Metal Engin.*, 22: 838-839, May, 1920.

ROBERT ARCHIBALD LAMBERT, M.D.

Assistant Professor of Pathology and Bacteriology

The Pathology of Phosgene Poisoning, in Collected Studies on the Pathology of War Gas Poisoning, pp. 36-61, Yale University Press, 1920 (with M. C. Winternitz). The Significance of Hemorrhages in Residual Pulmonary Lesions from Respiratory Irritating Gases, in Collected Studies on the Pathology of War Gas Poisoning, pp. 163-165, Yale University Press, 1920 (with M. C. Winternitz).

PHILIP GUSTAVE LAURSON, B.S., (Dakota Wesleyan College, 1907), S.B. (Massachusetts Institute of Technology, 1910),

Member, American Society of Civil Engineers

Assistant Professor of Engineering Mechanics

Problems in the design of the statistically indeterminate trusses of the emergency dams for protecting the lock gates of the Panama Canal. Investigation of the overstressing of many existing bridges caused by recent types of heavy freight locomotives. A study of deflections and secondary stresses in certain framed structures.

WILLIAM CORE DUFFY, M.D.

Instructor in Surgery

Papilloma of the Larynx. Report of a case treated with radium, with resultant chronic diffuse thyroïditis, *The Johns Hopkins Hospital Reports*, 18: 417-438, 1917. Hypophyseal Duct Tumors. A report of three cases and a fourth case of cyst of Rathke's pouch, *Annals of Surgery*, Nov. and Dec., 1920, pp. 537-555, 726-758.

GEORGE CLARK SOUTHWORTH, M.S.

Instructor in Physics

Electron Tube Generators of Alternating Currents of Ultra-Radio Frequencies, *Radio Review*, 1, no. 12, Sept., 1920. Electrical Measurements at Ultra-Radio Frequencies, *Radio Review*, 2, Jan., 1921.

ALAN TOWER WATERMAN, Ph.D.

Instructor in Physics

GRADUATES

GEORGE RAYMOND COWGILL, A.B. (Leland Stanford, Jr., Univ., 1916) *Physiological Chemistry*

Study in the Physiology of Vitamines (thesis for Ph.D.)

BEVERLY DOUGLAS, Litt.B. (Princeton, 1914), M.D. (Johns Hopkins, 1918) *Experimental Medicine*

Photographic Method for Determining Surface Area of Human Body.

Francois Arch Gillfillian, B.S. (Oregon State College, 1918), Ph.C. (Oregon State College, 1920) *Chemistry*

Some Catalytic Addition Reactions of Carbon Disulphide and of Carbon Dioxide (thesis for Ph.D.)

HENRY HAMILTON GREEN, D.Sc. (Glasgow University)

Physiological Chemistry

ERWIN BURR KELSEY, Ph.B. (Yale, 1918) *Chemistry*

Conversion of Substituted Chloranilides into Isothiocyanates and Rearrangement of the Latter into I-substituted Thiohydantoins (thesis for Ph.D.)

HELEN SWIFT MITCHELL, A.B., (Mt. Holyoke, 1917)

Physiological Chemistry

On the Ability of Rats and Mice to Choose Diets Adequate for Normal Growth (thesis for Ph.D.)

- EDITH HOLLOWAY NASON, A.B. (Vassar, 1917) *Chemistry*
 Synthesis of Cinnamyl Alcohol (thesis for Ph.D.)
- MARY WATERS PATTEN, A.B. (Goucher College, 1915) *Zoology*
 A Study of *Didinium Nasutum* (thesis for Ph.D.)
- FRANCISCO O. SANTOS, A.B. (University of Philippines, 1914),
 M.S. (University of Philippines, 1919) *Physiological Chemistry*
 Some Phases of Filipino Nutrition (thesis for Ph.D.)
- FRANCIS HUNTINGTON SWETT, B.A. (Bates College, 1916),
 M.S. (Brown University, 1917) *Zoology*
 Morphology and Development of Reduplicating Limbs in *Amblystoma*
- CHUAN FAH YAO, B.A. (Shanghai College, 1915), M.S.
 (Denison University, 1919) *Forestry*
 Comparative Study of the Three Principal Species of *Fraxinus* Mated
 in America and One Specie of *Fraxinus* Mated in China (thesis for
 M.S. degree).
 The Development of the Paper and Pulp Industry in China—published
 in the Chinese Students Quarterly Review.

UNDERGRADUATES FROM SHEFFIELD SCIENTIFIC SCHOOL

- | | |
|-----------------------------|-------------------------------|
| WILFRED GEORGE GEILE | <i>Civil Engineering</i> |
| JOHN JOEL SHIVELY | <i>Mechanical Engineering</i> |
| ARNOLD EVERETT BOWEN | <i>Electrical Engineering</i> |
| DAVID DAVIDSON | <i>Chemistry</i> |
| KASSON HOWE | <i>Electrical Engineering</i> |
| KEITH LANGDON MAUER | <i>Electrical Engineering</i> |
| LAUREN EARL SEELEY | <i>Mechanical Engineering</i> |
| RUFUS BENNETT SHORT | <i>Mechanical Engineering</i> |
| SAMUEL ARCHIBALD SMITH, JR. | <i>Mechanical Engineering</i> |

UNDERGRADUATES FROM YALE COLLEGE

- | | |
|--------------------------------|-------------------------|
| ANSON PHELPS STOKES HOYT | RAPHAEL BRYANT MALSIN |
| HENRY WHITING FERRIS | FRANCIS JAMES NORTON |
| MARCIEN JENCKES | WALTER BECKER SCHLEITER |
| FRANCIS DRING WETHERELL LUKENS | |

SIGMA XI CLUBS

OREGON AGRICULTURAL COLLEGE

Oregon Agricultural College at Corvallis has organized a Sigma Xi Club. A canvass shows twenty-four members of the society on the staff of that institution. The officers elected are as follows:

President—DR. NATHAN FASTEN

Secretary—DR. W. M. ATWOOD

Present plans include a meeting each quarter with papers of a research character and discussions of problems for the encouragement of research in the institution and in the state.

MEMBERSHIP SIGMA XI CLUB, OREGON AGRICULTURAL COLLEGE

1921-22

Name	Title	Chapter
ATWOOD, W. M., <i>Associate Professor Plant Physiology</i>	University of Washington	Chicago
BRANDON, H. C., <i>Professor Industrial Arts</i>		Indiana
BUKOWSKY, H. E., <i>Instructor Mechanical Engineering</i>		
COVELL, G. A., <i>Dean School of Engineering</i>	Cornell	Cornell
DUPRIEST, J. R., <i>Associate Professor Mechanical Engineering</i>	Cornell	
EPLING, CARL, <i>Instructor Botany</i>	California	
FASTEN, NATHAN, <i>Professor Zoology and Physiology</i>	Wisconsin	
FULTON, B. B., <i>Assistant Professor Entomology</i>	Ohio	
HAGUE, FLORENCE, <i>Instructor in Zoology and Physiology</i>	Illinois	
HARVEY, E. M., <i>Professor Horticultural Research</i>	Chicago	
JONES, J. S., <i>Professor Agricultural Chemistry</i>	Cornell	
LATHROP, F. H., <i>Associate Professor Entomology</i>	Ohio	
LAICHENGAYER, A. W., <i>Instructor in Chemistry</i>	Cornell	
LYNCH, J. E., <i>Instructor in Zoology and Physiology</i>	Nebraska	
MCKAY, MRS., <i>Formerly with Department of Agriculture, Plant Pathologist</i>	Nebraska	
MOCKMORE, C. A., <i>Instructor Civil Engineering</i>	Iowa	
OWENS, C. E., <i>Associate Professor Plant Pathology</i>	Indiana	
ROWLAND, F. E., <i>Professor of Industrial Chemistry</i>	Illinois	
SIMMONS, J. E., <i>Assistant Professor Bacteriology</i>	Wisconsin	
THOMAS, C. E., <i>Assistant Professor Mechanics and Materials</i>	Cornell	
WAIT, BERNICE, <i>Instructor in Household Science</i>	Illinois	
ZELLER, S. M., <i>Associate Professor Plant Pathology Research</i>	University of Washington	
ZELLER, MRS. S. M., <i>Formerly Instructor Department Botany, University of Washington</i>	University of Washington	
ZIEFLE, ADOLPH, <i>Dean School Pharmacy</i>	Michigan	

UNIVERSITY OF OKLAHOMA

The University of Oklahoma at Norman has organized a Sigma Xi Club. There are twenty-two members of the society in the institution, of whom six are from Chicago, three from Iowa, two each from Illinois, Michigan, and Indiana, one each from Wisconsin, Cornell, Kansas, Purdue, Washington, and Nebraska. Thirteen members are already Ph.Ds and three others are near it.

At the organization meeting the following officers were elected:

President—DR. S. W. REEVES

Vice-president—DR. ALMA J. NEILL

Secretary-Treasurer—DR. A. RICHARDS

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CHAPTER OFFICERS

LIST FURNISHED BY THE CORRESPONDING SECRETARIES OF THE CHAPTERS

CHAPTER	PRESIDENT	VICE-PRESIDENT	SECRETARY	TREASURER
Cornell.....	S. Simpson....	T. R. Briggs...	A. H. Wright...	O. A. Johannsen
Rensselaer.....	M. A. Hunter ..	R. B. Bourne ..	E. M. Clark...	W. J. Williams
Union.....	Ernst J. Berg..	Morland King..	M. F. Sayre ...	M. F. Sayre
Kansas.....	F. E. Kester...	G. E. Coghill..	C. M. Sterling.	H. E. Jordan
Yale.....	G. A. Baitsell..	S. J. Record...	F. L. Troxell...	A. H. Smith
Minnesota.....	R. E. Scammon ..	R. A. Gortner ..	A. T. Henrici ..	F. K. Butters
Nebraska.....	D. D. Whitney ..	Leunis Van Es..	E. N. Anderson ..	M. G. Gaba
Ohio.....	R. C. Osburn ..	M. Hollingsworth.....	C. A. Norman ..	T. G. Phillips
Pennsylvania	O. L. Shinn....	W. C. Farabee ..	H. C. Barker ..	H. S. Colton
Brown.....	P. H. Mitchell ..	R. F. Chambers ..	R. F. Borden ..	C. H. Currier
Iowa.....	H. L. Rietz....	L. P. Sieg ..	C. H. Farr ..	J. F. Reilly
Stanford.....	D. Campbell ..	A. F. Rogers ..	W. F. Dietrich ..	W. F. Dietrich
California.....	G. N. Lewis....	Frank Daniel ..	D. R. Hoagland ..	A. C. Alvarez
Columbia.....	J. K. Finch ..	W. I. Slichter ..	Harold A. Fales ..	Harold A. Fales
Chicago.....	F. R. Moulton ..	A. J. Carlson ..	C. R. Moore ..	C. R. Moore
Michigan.....	John C. Parker ..	A. F. Shull ..	P. O. Okkelberg ..	A. J. Decker
Illinois.....	J. B. Shaw ..	R. Adams ..	H. J. Van Cleave ..	F. B. Seely
Case.....	W. R. Veasey ..	C. D. Hodgemar ..	R. C. Hummel ..	T. M. Focke
Indiana.....	Will Scott ..	M. E. Hufford ..	C. A. Malott ..	C. E. Edmonson
Missouri.....	C. W. Greene ..	R. H. Baker ..	C. R. Moulton ..	O. R. Johnson
Colorado.....	R. D. Crawford ..	Ivan E. Wallin ..	Paul M. Dean ..	F. S. Bauer
Northwestern	C. B. Atwell ..	F. C. Whitmore ..	A. E. Cole ..	M. B. Fuller
Syracuse.....	O. W. H. Mitchell ..	C. C. Adams ..	L. C. Petry ..	H. F. A. Meier
Wisconsin...	V. Lenher ..	O. P. Watts ..	G. W. Keitt ..	H. W. March
University of Washington.....	S. H. Anderson ..	J. C. Rathbun ..	A. F. Carpenter ..	T. G. Thompson
Worcester.....	H. P. Fairfield ..	M. Masius ..	A. J. Knight ..	C. D. Knight
Purdue.....	A. N. Topping ..	R. H. Carr ..	H. S. Jackson ..	T. E. Mason
Washington University.....	G. T. Moore ..	M. T. Burrows ..	P. R. Rider ..	L. Pyle
District of Columbia.....	Paul Bartsch ..	J. Warren Smith ..	M. C. Hall ..	L. E. Whittemore
Texas.....	C. Hartman ..	B. C. Tharp ..	C. T. Gray ..	H. J. Ettlinger
Mayo Foundation.....	W. C. Kendall ..	W. C. MacCarty ..	T. B. Magath ..	T. B. Magath
North Carolina.....	J. H. Pratt ..		J. M. Bell ..	
North Dakota.....	R. T. Young ..	B. J. Spence ..	B. J. Clawson ..	B. J. Clawson

Offices of Recording and Corresponding Secretary combined according to advice of Convention with the exception of Yale and Texas in which chapters only the Corresponding Secretary is listed.

List corrected up to December 1, 1921.

OFFICIAL ANNOUNCEMENTS

Associate membership emblems can be secured only by order from the chapter secretary to the national secretary. All orders must be prepaid. Special order blanks sent on request.

SIGMA XI PUBLICATIONS

QUARTER CENTURY RECORD AND HISTORY bound in electric blue cloth. 1886-1911. 7,500 names. 550 pp. \$2.50.

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Eighth (New York) Convention. 1906. Pamphlet. 7 pp.

Ninth (Chicago) Convention. 1908. Pamphlet. 14 pp.

Tenth (Baltimore) Convention. 1909. Pamphlet. 6 pp.

Eleventh (Boston) Convention. 1909. Pamphlet. 16 pp.

Twelfth (Minneapolis) Convention. 1910. Pamphlet. 27 pp.

Thirteenth (Washington) Convention. 1911. Pamphlet. 27 pp.

Later conventions are reported in the QUARTERLY.

PRINTED BLANKS

The General Convention has instructed the Secretary to forward to chapters under the following stipulations:

Membership Certificates, stamped with the great seal of the Society. In packages of fifty prepaid, on advance payment of \$2.50 for each package. Please specify carefully whether for regular or associate members.

Index Cards, provided a duplicate set be sent for the general index of the Society maintained in the secretary's office. Gratis.

Statistical Record Blanks, for submitting annual reports giving chapter officers, elections, and other statistical data. Gratis.

MAILING LISTS FOR THE QUARTERLY

Chapter secretaries are requested to furnish a correct list of mailing addresses of active members for the printer. Blank forms. Gratis on demand.

The mailing list should be sent early in September and be valid for the academic year. All changes of address and all other correspondence should be addressed to the Secretary of Sigma Xi. Henry B. Ward, Urbana, Illinois.

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Vol. X

In Memoriam
Sigma Xi's Pr
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